

REMARKS

In the Office Action the Examiner objected to the title, rejected claims 1, 2, 5, 7, 10, 13, 14, and 18 under 35 U.S.C. 112, second paragraph, for being indefinite, rejected claims 1, 2, 4, 9, 12, 21, 22, and 24-26 under 35 U.S.C. 103 for being obvious, objected to claims 11 and 20 for being dependent on a rejected claim, and allowed claims 27-31. Claims 1-10, 12-19, and 21-31 remain in the application.

The rejection for indefiniteness was based on the use of the term "chemistry." The Examiner suggested using the term "species" instead. This change has been made in all of the claims containing the term chemistry.

The objection to claim 11 was that it depended on rejected claim 1 but was otherwise allowable. Claim 1 has been amended to include the limitations of claim 11 and is thus in the form indicated as being allowable. Claim 11 has been cancelled. Dependent claims 2-10 add important limitations to this claim 1 that is now in the allowable form. Similarly, claim 20 was objected to for being dependent on rejected claim 14. Claim 14 has been amended to include the limitations of claim 20 and is also thus in the form indicated as being allowable. Claim 20 has been cancelled. Claims 13 and 21 have been amended so that they now include the limitations that were added by claims 11 and 20 to claims 1 and 14, respectively. Accordingly, these claims are believed to be allowable consistent with the Examiner's indication of allowability of claims 11 and 20. Thus all claims remaining in the application are in a condition either specifically indicated to be allowable or consistent with the what the Examiner has indicated is allowable.

All of the claims remaining in the application are provided herein for the convenience of the Examiner. Claim 6 was amended to correct a minor error.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. No amendment made was for the purpose of narrowing the scope of any claim, unless Applicants have argued herein that such amendment was made to distinguish over a particular reference or combination of references.

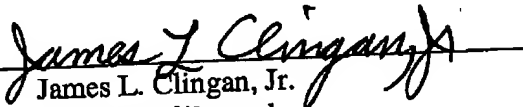
Applicants believe the application is in condition for allowance which action is respectfully solicited. Please contact the below-signed if there are any issues regarding this communication or otherwise concerning the current application.

Respectfully submitted,

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TITLE - VERSION WITH MARKINGS TO SHOW CHANGES MADE

SELECTIVE METAL OXIDE REMOVAL PERFORMED IN A REACTION CHAMBER IN  
THE ABSENCE OF RF ACTIVATION

## CLAIMS - VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A method for forming a semiconductor device comprising:
  - providing a semiconductor substrate;
  - forming a metal oxide layer over the semiconductor substrate;
  - forming a patterned gate electrode over a first portion of the metal oxide layer; and
  - removing a second portion of the metal oxide layer by heating the semiconductor substrate and flowing a halide-containing [chemistry] species over the substrate while heating, wherein the second portion of the metal oxide layer is adjacent to the first portion of the metal oxide layer;

wherein removing a second portion of the metal oxide layer is performed in a reaction chamber in the absence of rf activation.
2. (Amended) The method of claim 1, wherein the halide-containing [chemistry] species further comprises hydrogen.
3. (Amended) The method of claim 2, wherein the halide-containing [chemistry] species is HCl.
5. (Amended) The method of claim 1, further comprising:
  - forming an patterned ARC layer over the patterned gate electrode prior to the flowing of the halide-containing [chemistry] species; and
  - removing the patterned ARC layer after the flowing of the halide-containing [chemistry] species.
6. (Amended) The method of claim 5, further comprising:
  - forming a first interfacial oxide layer under the metal oxide layer;
  - removing at least a portion of the first interfacial oxide after removing the second portion of the metal oxide layer[;].
7. (Amended) The method of claim 6, wherein removing at least a portion of the first interfacial oxide layer is performed using a [chemistry] species containing hydrogen and fluorine.

10. (Amended) The method of claim 9, wherein the step of removing is further characterized as being at a pressure of about 50 torr for approximately 60 seconds and a flow rate of the halide-containing [chemistry] species at about one SLM.

13. (Amended) A method of removing a metal oxide layer that is over a semiconductor substrate, comprising:

placing the semiconductor substrate into a reaction chamber;

heating the metal oxide layer;

flowing, in the absence of rf activation, a chlorine-containing [chemistry] species while heating, wherein the chlorine-containing [chemistry] species reacts with a portion of the metal oxide layer to create a byproduct, wherein the byproduct comprises an element from the metal oxide layer; and

removing the byproduct from the reaction chamber.

14. (Amended) A method for forming a semiconductor device comprising:

providing a semiconductor substrate;

forming a metal oxide layer over the semiconductor substrate comprising hafnium and oxygen;

removing a portion of the metal oxide layer by heating the semiconductor substrate using radiation and flowing a [chemistry] species containing hydrogen and chlorine;

wherein removing a second portion of the metal oxide layer is performed in a reaction chamber in the absence of RF activation.

18. (Amended) The method of claim 17, wherein removing at least a portion of the first interfacial oxide layer is performed using a [chemistry] species containing hydrogen and fluorine.

21. (Amended) A method of forming a metal oxide comprising:
- providing a semiconductor substrate;
  - forming a metal oxide layer over the semiconductor substrate; and
  - removing a portion of the metal oxide layer by heating the semiconductor substrate and  
flowing a gaseous halide;
  - wherein removing a portion of the metal oxide layer is performed in a reaction chamber in  
the absence of RF activation.

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**13** Number of Pages (including this page)

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**MESSAGE:**

Enclosed herewith, please find FORMAL AMENDMENT for filing in the below-identified application. If Applicant has overlooked any fees, or if any overpayment has been made, the Commissioner is hereby authorized to credit or debit Deposit 502117.

**ALL ITEMS MARKED WITH AN "X" ARE INCLUDED:**

1.	x	1 page Facsimile Cover Sheet
2.	x	12 page Amendment

**Paid by Deposit Account: 502117 \$0**

**I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS  
BEING FACSIMILE TRANSMITTED TO THE PATENT AND TRADEMARK OFFICE:**

ON: 12/31/02  
Date

*Elaine Cox*  
Signature

**PLEASE GIVE THESE PAPERS TO:**

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GROUP ART UNIT: 2823  
SERIAL NO.: 09/916,023  
FILED: JULY 26, 2001  
INVENTOR: CHRISTOPHER C. HOBBS